

## APPENDIX E

### MAJOR DIFFERENCES BETWEEN SRP AND HANFORD TANKS

#### 1.0 Summary

The most recent designs for high-level waste tanks at the Savannah River Plant (SRP) and at Hanford are similar in principle. Both designs utilize a double-shell concept to contain and shield high-level wastes. However, the waste stored in the SRP tanks exhibits heat generation and radionuclide concentration characteristics that are higher than the Hanford waste by a factor of fifteen. Processing of Savannah River waste does not presently include cesium or strontium removal steps as does the current Hanford waste management procedure. The inherent difference in the waste requires different provisions for heat removal at the two sites. Wastes at both plants are evaporated to achieve a volume reduction.

Differences in the environment between Hanford and SRP tanks exist but do not contribute to notable differences in design. The SRP tanks are located in a wet climate with a shallow groundwater level. Hanford tanks are situated in a dry climate with groundwater levels in excess of 150 ft below the tanks.

A summary of the characteristics of each design is included in Table E-1.

#### 2.0 Tank Structure

The basic tank structures of SRP and Hanford tanks are similar in concept; both tanks include a cylindrical primary tank contained with a secondary liner enclosed in concrete. The SRP tanks employ a concrete center post to support the flat roof as shown in Figure 3.3. The Hanford tanks utilize a self-supporting dome-shaped roof. Both designs employ a gridwork of slots in the insulating concrete and the base concrete to remove leakage from the primary and secondary tanks. Cooling air is routed through the slots in the insulating concrete and up through the annulus to remove heat.

TABLE E-1

Summary of Current Design of HLW Tank Characteristics  
at Hanford and SRP\*

Element	Hanford	SRP
Volume	1.0 m gal	1.3 m gal
Design	ASME Sec. VIII, Div. 2	ASME Sec. VIII, Div. 1
Design Life	50 years	40 to 60 years
Heat Generation Rate, maximum	50,000 Btu/hr	3,000,000 Btu/hr
Heat Removal, max design value	100,000 Btu/hr	6,000,000 Btu/hr
Earth Cover	6.5 feet minimum	None
Roof Type	Self-supporting dome	Flat with supporting center column
Live Load	40 lb/ft <sup>2</sup> plus 50 tons concentrated	275 lb/ft <sup>2</sup>
Steel Type - Primary Tank	ASTM A-537, Class I carbon steel $\sigma_y$ - 50,000 psi	ASTM A-537, Class I carbon steel $\sigma_y$ - 50,000 psi
Specific Gravity of Waste, max	2.0	1.8
Annulus Air Flow	800 cfm	8,000 cfm
Max Primary Tank Skin Temperature	200°F	None specified, probably will be below 70°F
Water-Cooled Coils	None	3 to 3.5 miles of pipe per tank

\* References:

- C| Final Environmental Statement, Waste Management Operations,  
Savannah River Plant, Aiken, South Carolina. USERDA Report  
ERDA-1537, U.S. Energy Research and Development Adminis-  
tration, Washington, DC (1977).
- Letter, J. F. Albaugh, A. W. Akerson to A. G. Lassila,  
Trip Report, Wilmington, Savannah River Information Exchange  
on Waste Storage Tanks (November 24, 1975).
- Telecon - J. F. Albaugh, Rockwell Hanford Operations,  
to D. Coon and B. Osborne, Savannah River Project  
(October 24, 1979).

Design of SRP tanks was based on ASME Sec. VIII, Div. 1, while Hanford tanks were designed in accordance with Div. 2. Both designs included stress relieving the primary tank after fabrication. Nearly identical nondestructive testing procedures were used to verify integrity.

The SRP tanks do not require earth cover for shielding. A 48-in. thick, flat, concrete roof provides adequate shielding. Hanford tanks utilize less concrete thickness in the dome but are buried beneath a minimum of 6.5 ft of earth cover.

### 3.0 Ventilation and Cooling

The higher heat generation in SRP tanks requires special provisions for cooling. The maximum heat generation is expected to be on the order of 3,000,000 Btu/hr from fresh high-level liquid waste. With the ventilation airflow, each SRP tank is designed to remove 6 million Btu/hr. This is compared to a heat removal rate of 100,000 Btu/hr for Hanford tanks. Annulus ventilation flow rates are 8,000 cfm for SRP tanks and 800 cfm for Hanford tanks. The difference in cooling capacity reflects the different heat generation rates of the wastes stored in the tanks.

### 4.0 Leak Detection

Both SRP and Hanford tanks have similar leak detection provisions which alarm in a manned facility. In addition, automated liquid level gauges provide supplementary data on the loss of liquid from the primary tank. Both designs include sumps to collect liquid from the slots in the base concrete (secondary liner leakage).